

FORM PTO-1390  
(REV 10-94)

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

ATTORNEY'S DOCKET NUMBER

TRANSMITTAL LETTER TO THE UNITED STATES  
DESIGNATED/ELECTED OFFICE (DO/EO/US)  
CONCERNING A FILING UNDER 35 U.S.C. 371

10178.115USWO

U.S. APPLICATION NO (If known, see 37 C.F.R. 1.5)

TO BE ASSIGNED 09/341549

INTERNATIONAL APPLICATION NO.

PCT/FI98/00034

INTERNATIONAL FILING DATE

16 January 1998

PRIORITY DATE CLAIMED

20 January 1997

TITLE OF INVENTION

DETERMINATION OF SERVICE SITUATION IN PACKET RADIO NETWLK

APPLICANT(S) FOR DO/EO/US

KARI, Hannu and HANNULA, Antti

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(l).
4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
  - a. ☒ is transmitted herewith (required only if not transmitted by the International Bureau).
  - b. ☒ has been transmitted by the International Bureau.
  - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US)
6. ☐ A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
  - a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
  - b. ☐ have been transmitted by the International Bureau.
  - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
  - d. ☐ have not been made and will not be made.
8. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)).
10. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

**Items 11. to 16. below concern document(s) or information included:**

11. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☒ A FIRST preliminary amendment.  
☐ A SECOND or SUBSEQUENT preliminary amendment.
14. ☐ A substitute specification.
15. ☐ A change of power of attorney and/or address letter.
16. ☒ Other items or information: Form 1449, copy of 6 references, IB/308, return postcard

U.S. APPLICATION NO (If known, see 37 CFR 1.5)

INTERNATIONAL APPLICATION NO

ATTORNEY'S DOCKET NUMBER

TO BE ASSIGNED

PCT/FI98/00034

10178.115USWO

09/341549

17. [X] The following fees are submitted:

**BASIC NATIONAL FEE (37 CFR 1.492(a) (1)-(5)):**

Search Report has been prepared by the EPO or JPO.....\$840.00

International preliminary examination fee paid to U.S. Patent and Trademark Office  
(37 CFR 1.492(a)(1)).....\$670.00No international preliminary examination fee paid to USPTO (37 CFR 1.482)  
but international search fee paid to USPTO (37 CFR 1.445(a)(2)).....\$760.00Neither international preliminary examination fee (37 CFR 1.482) nor  
international search fee (37 CFR 1.445(a)(3)) paid to USPTO .....\$970.00International preliminary examination fee paid to USPTO (37 CFR 1.482)  
and all claims satisfied provisions of PCT Article 33(2)-(4) .....\$96.00**CALCULATIONS PTO USE ONLY****ENTER APPROPRIATE BASIC FEE AMOUNT = \$970**Surcharge of **\$130.00** for furnishing the oath or declaration later than [ ] 20 [ ] 30  
months from the earliest claimed priority date (37 CFR 1.492(e)).**\$0**

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE	
Total claims	19	-20 = 0	X \$18.00	\$0
Independent claims	1	-3 = 1	X \$78.00	\$0

MULTIPLE DEPENDENT CLAIM(S) (if applicable)

+ \$260.00

**\$0****TOTAL OF ABOVE CALCULATIONS = \$970**Reduction by 1/2 for filing by small entity, if applicable. Verified Small Entity  
Statement must also be filed (Note 37 CFR 1.9, 1.27, 1.28).**\$0****SUBTOTAL = \$970**Processing fee of **\$130.00** for furnishing the English translation later than [ ] 20 [ ] 30  
months from the earliest claimed priority date (37 CFR 1.492(f)).

+ \$0

**TOTAL NATIONAL FEE = \$970**Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be  
accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property

+ \$0

**TOTAL FEES ENCLOSED = \$970**Amount to be:  
refunded \$0

charged \$0

a. [X] Check(s) in the amount of \$970 to cover the above fees is enclosed.b. [ ] Please charge my Deposit Account No. \_\_\_\_\_ in the amount of \$ \_\_\_\_\_ to cover the above fees.  
A duplicate copy of this sheet is enclosed.c. [X] The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any  
overpayment to Deposit Account No. 13-2725.**NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR  
1.137(a) or (b)) must be filed and granted to restore the application to pending status.**

SEND ALL CORRESPONDENCE TO

Michael B. Lasky

MERCHANT &amp; GOULD P.C.

3100 Norwest Center

90 South Seventh Street

Minneapolis, MN 55403

SIGNATURE

Michael B. Lasky

NAME

29,555

REGISTRATION NUMBER

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: KARI, Hannu and HANNULA, Antti      Docket No.: 10178.115USWO  
Serial No.: TO BE ASSIGNED (Corresponding to PCT/FI98/00034)  
Filed: 13 July 1999  
International Filing Date: 16 January 1998  
Title: DETERMINATION OF SERVICE SITUATION IN A PACKET RADIO  
NETWORK

CERTIFICATE UNDER 37 CFR 1.10:

"Express Mail" mailing label number: EL176168366US

Date of Deposit: 12 July 1999

I hereby certify that this correspondence is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to Assistant Commissioner for Patents, Washington, D.C. 20231.

By: Michael L. Roush

Name: Michael Roush

PRELIMINARY AMENDMENT

Box PCT  
Assistant Commissioner for Patents  
Washington, D.C. 20231

Dear Sir:

In connection with the above-identified application filed herewith, please enter the following preliminary amendment:

**IN THE ABSTRACT**

Insert the attached Abstract page into the application as the last page thereof.

**IN THE SPECIFICATION**

Enclosed is a copy of Form PCT/IB/308 indicating communication of the international application to the Designated Offices. A courtesy copy of the present specification is enclosed herewith, however, but the World Intellectual Property Office (WIPO) copy should be relied upon if it is already in the U.S. Patent Office.

## IN THE CLAIMS

Please amend the claims as follows:

In claim 4, line 1, please replace "according to claim 2 or 3" with  
—according to claim 2—.

In claim 5, line 1, please replace "according to claim 2 or 3" with  
—according to claim 2—.

In claim 6, line 1, please replace "according to claim 2 or 3" with  
—according to claim 2—.

In claim 9, line 1, please replace "according to claim 2 or 8" with  
—according to claim 2—.

In claim 13, line 1, please replace "according to any one of claims 1 to 12"  
with —according to claim 1—.

In claim 14, line 1, please replace "according to any one of claims 1 to 12"  
with —according to claim 1—.

Please add the following new claims:

16. (New) A method according to claim 3, characterized in that the  
parameter is determined on the basis of the utilization ration of the capacity of the base  
station system.

17. (New) A method according to claims 3, characterized in that the  
parameter is determined on the basis of time stamps of the downlink packets.

18. (New) A method according to claim 3, characterized in that the  
parameter is determined by the success probability of resource reservation attempts or on  
the basis of the waiting times of resource reservations.

19. (New) A method according to claim 8, characterized in that the  
parameter is sent at least to some terminal equipments, preferably to a terminal equipment

that has just registered to the network, individually, such as a Point-To-Point transmission or a short message.

### REMARKS

A new abstract page is supplied to conform to that appearing on the publication page of the WIPO application, but the new Abstract is typed on a separate page as required by U.S. practice.

The above preliminary amendment is made to remove multiple dependencies from claims 4-6, 9 and 13-14.

Applicant respectfully requests that the preliminary amendment described herein be entered into the record prior to calculation of the filing fee and prior to examination and consideration of the above-identified application.

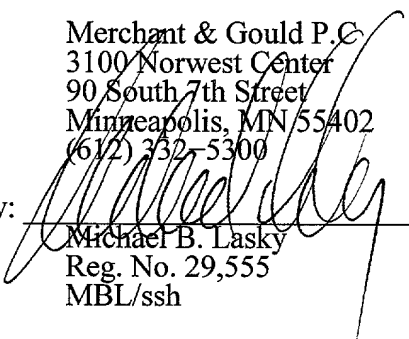
If a telephone conference would be helpful in resolving any issues concerning this communication, please contact Applicant's primary attorney-of record, Michael B. Lasky.

Respectfully submitted,

Merchant & Gould P.C.  
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Minneapolis, MN 55402  
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Dated: 13 July 1999

By:

  
Michael B. Lasky  
Reg. No. 29,555  
MBL/ssh

PTO/PCT Rec'd 13 JUL 1999

1

**DETERMINATION OF SERVICE SITUATION IN PACKET RADIO NETWORK****BACKGROUND OF THE INVENTION**

The invention relates to a method for transmitting the prevailing service situation of the telecommunication connection to the subscriber.

- 5 The invention will be explained primarily in connection with packet radio systems, such as GPRS, but it can also be applied to other kinds of telecommunication systems. Figure 1 shows the parts of the packet network essential for understanding the invention. Mobile stations MS communicate with base stations BTSn (Base Transceiver Station) over an air interface Um.
- 10 Base stations are controlled by base station controllers BSC which are connected to mobile switching centres MSC. The subsystem managed by the base station controller BSC, including the base stations controlled by it, is generally referred to as a base station subsystem BSS. The interface between the centre MSC and the base station subsystem BSS is called an A-interface.
- 15 The part of the mobile communication system on the side of the MSC at the A-interface is known as a network subsystem NSS. Correspondingly, the interface between the base station controller BSC and the base station BTS is called an Abis-interface. The mobile switching centre MSC attends to the switching of incoming and outgoing calls. It carries out similar tasks as the
- 20 exchange of the public switched telephone network PSTN. In addition, it carries out functions characteristic of mobile telephone traffic only, such as subscriber location management, in co-operation with network subscriber registers which are not shown separately in Figure 1.

- A conventional radio connection used in digital mobile communication systems is circuit-switched, which means that the radio resources reserved for a subscriber are kept reserved for this connection for the duration of the call. Packet radio service GPRS (General Packet Radio Service) is a new service designed for digital mobile communication systems, such as GSM systems. The packet radio system is described in ETSI recommendations TC-
- 25 TR-GSM 02.60 and 03.60. By means of a packet radio service, a user of the mobile station MS can be provided with a radio connection which efficiently utilizes radio resources. In a packet-switched connection radio resources are reserved only when speech or data is to be sent. Speech or data is assembled into packets of a specific length. When such a packet has been sent over the
- 30 air interface Um and the sending party does not immediately have the next
- 35

packet to send, the radio resource can be released to the use of other subscribers.

The system of Figure 1 includes a separate Serving GPRS Support Node, that is, an SGSN 15 which controls the operation of the packet data service on the network side. This control includes, for example, registrations of the mobile station to the system and from the system (Logon and Logoff, respectively), updating mobile stations location and routing data packets to the correct destination. In the context of the present application, "data" broadly interpreted refers to any information transmitted in a digital mobile communication system, including, but not limited to speech encoded into a digital form, data transmission between computers or telefax data. The SGSN may be located in connection with the base station BTS, the base station controller BSC or the mobile switching centre MSC or it may be located separately from them. The interface between the SGSN and the base station controller BSC is known as a Gb-interface.

In a packet radio network a situation is conceivable in which the subscriber using a computer PC is in contact with another computer 14 via a packet network 10, a data network 11, a router 13 and a local area network LAN. There is an ongoing long data transmission or several successive short data transmissions between the computers PC and 14 in accordance with Internet FTP protocol, for example. At the same time, a user of the computer PC or some other user starts an interactive session in accordance with Internet Telnet protocol, for example. If a packet of each interactive session had to wait at nodes along the connection until the long data transmission had been terminated, the response times of the interactive session would grow so long that the use of the service would no longer be sensible.

Network operators typically determine several classes for the quality of service (QoS) so that in a higher class for the quality of service the propagation delay (and possibly also the probability of losing the packet) is smaller than in a lower class for the quality of service. In this invention, propagation delay is the most significant parameter connected with the quality of service. The operator may determine three classes for the quality of service, for example, for which two propagation delays  $T_{AVE}$  and  $T_{95}$  have been determined, the first ( $T_{AVE}$ ) of which determines the average propagation delay of the packet in the network of the operator and the second ( $T_{95}$ ) determines such a delay that 95 per cent of the packets are transmitted on a smaller delay

than  $T_{95}$ . The correspondence of classes for the quality of service and propagation delays could be as follows:

Table 1, a typical correspondence of classes for the quality of service and propagation delays:

Quality of service	$T_{AVE}$ (ms)	$T_{95}$ (ms)
1	400	1000
2	800	2000
3	1600	4000

(It is obvious that these values are only examples. There may be more than three classes for the quality of service, a median can be employed instead of the arithmetic average and other percentages can be used instead of 95 per cent.)

There are several problems in the arrangement described above. For example, there are no pre-determined protocols for transmitting the prevailing service situation to the user and/or the application programs and no specified procedures with which the application programs could automatically adapt to changes in the service situation. Although the users or the application programs may estimate and determine independently the prevailing service situation in the quality of service which has been negotiated at each time, the users or the application programs cannot receive information independently about other classes for the quality of service and thus cannot make any objective conclusions on whether the quality of service should be re-negotiated to be higher or lower.

#### BRIEF DESCRIPTION OF THE INVENTION

The object of the invention is to develop a method for solving the problems mentioned above. The objects of the invention are achieved by a method that is characterized by what is stated in the characterizing part of claim 1. The dependent claims relate to the preferred embodiments of the invention.

The invention is at its simplest implemented by establishing a method for indicating the service situation in a packet radio network which includes at least one base station BTS and at least one terminal equipment (a mobile station MS and a computer PC possibly connected or integrated thereto), and where several classes for the quality of service have been



determined. According to the invention, at least one parameter describing the service situation of the packet radio network is determined and this parameter is made available to the terminal equipment (MS, PC). In this case the terminal equipment (the person using it and/or the application program to be executed therein) has available exact and objective information on the service situation of the network. The user and/or application program may conclude, for example, that information is received slowly regardless of the good service situation in the network. In this case the application program or its user can conclude that the delay is caused by the loading of the server in which case the negotiation of the quality of service into a better one will not improve the situation. This conclusion cannot be made objectively if the service situation is determined subjectively in the terminal equipment (by estimating or measuring the effective data transmission rate) as the terminal equipment or its user cannot distinguish the delays caused by the network from the delays caused by the server.

According to a preferred embodiment of the invention, the network determines the prevailing service situation in each class for the quality of service and this information is transmitted to the terminal equipment. In this case the terminal equipment (or its user) has available objective information on the service situation prevailing in the other classes for the quality of service. The application to be executed in the terminal equipment or its user may then decide to negotiate a higher or a lower class for the quality of service, as required.

According to another preferred embodiment of the invention, the service situation in the neighbouring base stations is used as a criterion in connection with handover, in which case the mobile stations can be handed over to a base station whose audibility is poorer but the service situation better (loading smaller) than in the base station which serves the mobile station.

The advantage of the method and system of the invention is a more efficient use of packet radio network resources as the users and/or applications making decisions (change of the service quality or handover) have available objective information on the prevailing service situation.

#### BRIEF DESCRIPTION OF THE FIGURES

The invention will now be explained in more detail in connection with preferred embodiments, with reference to the appended drawing, wherein:

Figure 1 shows the parts of the packet network essential for understanding the invention.

#### DETAILED DESCRIPTION OF THE INVENTION

As was stated above, the invention is at its simplest implemented by establishing a method for indicating the service situation in a packet radio network which includes at least one base station BTS and at least one terminal equipment (a mobile station MS and a computer PC possibly connected or integrated thereto), and where several classes for the quality of service have been determined. According to the invention, at least one parameter representing the service situation of the packet radio network is determined and this parameter is made available to the terminal equipment (MS, PC).

According to one preferred embodiment, the parameter representing the service situation is determined in some fixed network element of the network, such as the base station system BSS or the support node SGSN. Alternatively, said parameter can be determined in the terminal equipment (MS, PC).

The prevailing service situation in the service quality used by the mobile station MS can be determined in several different ways. One possible technique is based on that the parameter is determined on the basis of the utilization ratio of the capacity of the base station system BSS, for example by determining the ratio of free channels to reserved channels. The parameter can also be determined by following on which probability and/or delay the mobile stations are able to reserve resources, such as traffic channels. It is also possible to calculate the number of packets sent to the mobile station MS per a time unit and maintain the moving time average of this number. Alternatively, it is also possible to use the fact that in most packet networks packets are time stamped when they arrive at the network, in which case the parameter representing the service situation may be determined on the basis of the time stamps of the downlink packets, for example. On the basis of this time stamp, it is possible to determine the two propagation delays  $T_{AVE}$  and  $T_{95}$  (or one of them) described in connection with Table 1. This calculation may be carried out in the support node SGSN, the base station controller BSC or the base station BTS, for example.

If the parameter representing the service situation is determined in some fixed network element, such as the base station system BSS or the

support node SGSN, this parameter can be sent to the terminal equipment (MS, PC) on a broadcast control channel. Suitable channels in the GPRS system are BCCH or PBCCH, for instance. Alternatively, this parameter can be sent to terminal equipment (MS, PC) as a multicast transmission, such as a  
5 Point-To-Multipoint transmission. Instead of the multicast transmission, the parameter can be sent to one terminal equipment (MS, PC) at a time, as a Point-To-Point transmission or as a short message in the GPRS system. A multicast transmission and an individual transmission may be combined so that the parameter is sent to the terminal equipment generally as a multicast  
10 transmission but to a terminal equipment that has just registered to the network individually as a Point-to-Point transmission or as a short message, for example.

In order that the user of the terminal equipment or the application program executed therein could make objective decisions concerning the  
15 change of the service quality, it is advantageous that said parameter is determined in more than one class for the quality of service. If the parameters are sent to all terminal equipments at the same time (e.g. broadcast or multicast), it is most advantageous to send simultaneously the parameters representing the situation of all the classes for the quality of service. If the  
20 parameters are instead sent individually to the terminal equipments, capacity may be saved by sending primarily only the parameters representing the situation of the upper and lower classes for the quality of service in addition to the quality of service used at each time.

Conventional cell and handover algorithms are usually based only  
25 on signal quality. There may also be situations where the neighbouring base station of the base station that serves the mobile station would have more capacity and it could provide a faster connection than the base station that serves the mobile station at that moment. Then it is advantageous if the parameter representing the service situation is determined at least for two  
30 base stations (the base station that serves the mobile station and the neighbouring base station with the best audibility), and the parameter is employed as a crossover criterion. One possibility to employ the capacity of the base station as a crossover criterion is to weigh signal strength measurements so that the base station which has a great deal of unused  
35 capacity is notified of signal strength higher than the actual value, and vice versa. In this way changes to known crossover algorithms are minimal.

When information on the service situation of the classes for the quality of service has been made available to the terminal equipment (either by calculating some parameter representing service in the terminal equipment or by calculating the information in the network and by sending it to the mobile station), this information has to be made available to application program and/or its user. The information on the service situation of the classes for the quality of service can be employed in the application program for example so that the criteria have been determined in advance, on the basis of which criteria the application negotiates the class for the quality of service higher or lower if the parameter representing the service situation is smaller or greater, respectively, than some predetermined threshold value. Then it is also advantageous to determine a specific hysteresis, for example, in such a manner that a higher (faster) class for the quality of service is negotiated if the parameter falls below the threshold value by 10 per cents and a lower (less expensive) class for the quality of service is negotiated if the parameter exceeds the threshold value by 10 per cents. Instead of the hysteresis or in addition to it, time delay can be determined for example so that the quality of service is re-negotiated only if the parameter has been below or above the threshold value for a certain time, such as one minute. In that case, however, the new class for the quality of service can be negotiated immediately if there is a great deviance from the threshold value towards a poorer value (e.g. if the average propagation delay exceeds two times the normal value). In this way the terminal equipment and the application program executed therein can make decisions independently, without disturbing the user, by means of which decisions the ratio of the service level to costs is maintained at the optimal level.

In some cases it should be possible to change the quality of service in a manner that is almost impossible to program in advance. For example, a situation is conceivable in which the user uses the mobile station (and a computer connected or integrated thereto) for taking care of bank transactions when waiting for the departure of the aeroplane. When the departure of the aeroplane is announced, the user is probably willing to pay considerably for the improvement of the service quality to finish the bank transaction. A reverse example may be a user who wishes to start a data transmission by using a high class for the quality of service (in order than the interactive phase would take place as fast as possible) but the actual data transmission can take place

slower in a less expensive class for the quality of service. In order that the user of the terminal equipment could individually decide to change the quality of service, the user has to be informed of the parameter representing the service situation. The service situation can be transmitted to the user for  
5 example so that there is in a corner of the screen of the mobile station MS and/or the computer PC an element (e.g. a number, a dot or a bar) indicating the prevailing service situation, some feature (such as a numerical value, the size, the colour or the blinking speed) of the element being dependent on the service situation. By pointing to this element with the transfer mechanism of  
10 the cursor (such as keyboard, mouse, etc.), the user can start a dialogue where more exact information is shown and through which the user can re-negotiate the quality of service. When the quality of service is changed automatically by a negotiation between the application program and the network, it may be advantageous to produce some audio signal so that the  
15 user would have a chance to accept or discard the change of service quality suggested by the application program.

It will be evident to those skilled in the art that the basic idea of the invention may be realized in various ways. The invention and its embodiments are therefore not restricted to the examples described above but they may  
20 vary within the scope of the claims.

## CLAIMS

1. A method for indicating the prevailing service situation in a packet radio network which includes at least one base station (BTS) and at least one terminal equipment (MS, PC), and where several classes for the quality of service have been determined;  
5 **characterized** by
- determining at least one parameter representing the service situation of the packet radio network; and
  - supplying this parameter to the use of the terminal equipment (MS,  
10 PC).
2. A method according to claim 1, **characterized** in that the parameter is determined in some fixed network element of the network, such as a base station system (BSS) or a support node (SGSN).
3. A method according to claim 1, **characterized** in that the  
15 parameter is determined in the terminal equipment (MS, PC).
4. A method according to claim 2 or 3, **characterized** in that the parameter is determined on the basis of the utilization ratio of the capacity of the base station system (BSS).
5. A method according to claim 2 or 3, **characterized** in that  
20 the parameter is determined on the basis of time stamps of the downlink packets.
6. A method according to claim 2 or 3, **characterized** in that the parameter is determined by the success probability of resource reservation attempts or on the basis of the waiting times of resource reservations.
7. A method according to claim 2, **characterized** in that the  
25 parameter is sent to the terminal equipment (MS, PC) on a broadcast channel, preferably on BCCH or PBCCH.
8. A method according to claim 2, **characterized** in that the parameter is sent to the terminal equipment (MS, PC) as a Point-To-Multipoint  
30 transmission.
9. A method according to claim 2 or 8, **characterized** in that the parameter is sent at least to some terminal equipments (MS, PC), preferably to a terminal equipment that has just registered to the network, individually, such as a Point-To-Point transmission or a short message.
10. A method according to claim 2, **characterized** in that the  
35 parameter is determined in more than one class for the quality of service.

11. A method according to claim 2, **characterized** in that the parameter is determined in all classes for the quality of service in the packet radio network.

12. A method according to claim 1, **characterized** in that the  
5 parameter is determined relating to at least two base station systems (BSS) and the parameter is employed as a crossover criterion.

13. A method according to any one of claims 1 to 12, **characterized** in that the parameter is transmitted to the user of the terminal equipment (MS, PC).

10 14. A method according to any one of claims 1 to 12, **characterized** in that the parameter is made available to the application program being executed in the terminal equipment (MS, PC).

15 15. A method according to claim 14, **characterized** in that at least one nominal value is defined for said application program and the application program independently negotiates a new class for the quality of service if said parameter deviates essentially from said nominal value.

## ABSTRACT

A method for indicating the prevailing service situation in a packet radio network which includes at least one base station and at least one terminal equipment, and where several classes for the quality of service have been determined. In accordance with the invention, at least one parameter representing the service situation of the packet radio network is determined and this parameter is made available to the terminal equipment. The parameter can be determined in some fixed network element of the network, such as a base station system or a support node. Alternatively, the parameter can be determined in the terminal equipment. The parameter can be sent simultaneously to several terminal equipments on a broadcast channel, preferably on BCCH or PBCCH or as a multicast transmission (e.g. Point-To-Multipoint) or it can be sent to one terminal equipment at a time as a Point-To-Point transmission or a short message, for example. If the parameters are sent to all terminal equipments at the same time, it is most advantageously to send simultaneously the parameters representing the situation of all the classes for the quality of service.

**CERTIFICATE UNDER 37 CFR 1.10:**

"Express Mail" mailing label number: EL176168366US

Date of Deposit: 12 July 1999

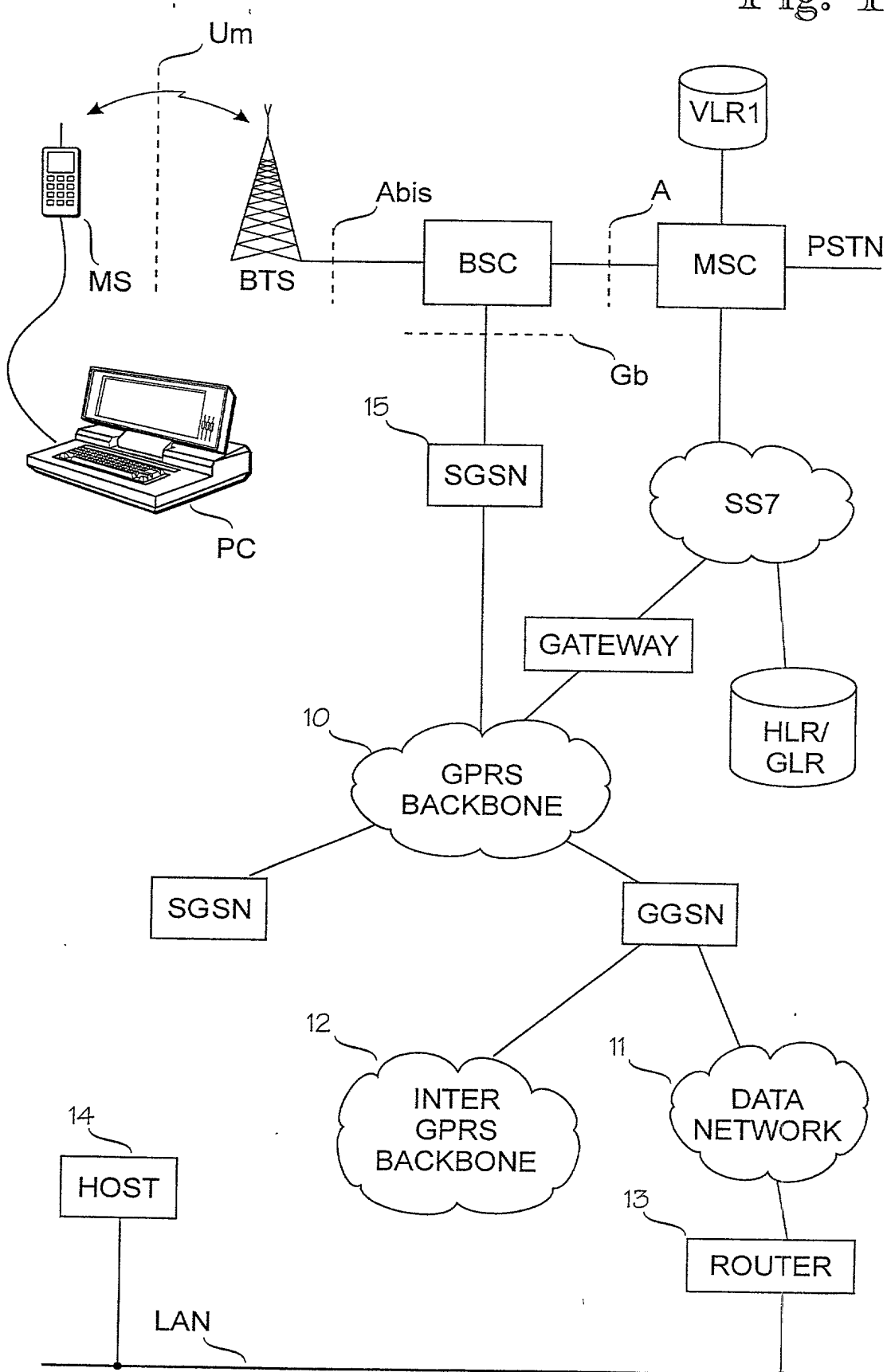
I hereby certify that this correspondence is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to Assistant Commissioner for Patents, Washington, D.C. 20231.

By: 

Name: Michael Roush



Fig. 1



# MERCHANT & GOULD

## United States Patent Application

### INSTRUCTIONS

### COMBINED DECLARATION AND POWER OF ATTORNEY

As a below named inventor I hereby declare that: my residence, post office address and citizenship are as stated below next to my name: that

I verily believe I am the original, first and sole inventor (if only one name is listed below) or a joint inventor (if plural inventors are named below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

Insert TITLE of invention

Determination of service situation in packet radio network

Check a or b

The specification of which

a. ☐ is attached hereto

b. ☐ was filed on \_\_\_\_\_

If "b" checked, complete

as application serial no. \_\_\_\_\_

and was amended on \_\_\_\_\_ (if applicable)

If PCT Application

(in the case of PCT-filed application)

Insert Int. application  
number & filing date

described and claimed in international no. PCT/FI98/00034 filed 16 January 1998

and as amended on \_\_\_\_\_ (if any), which I have reviewed and for which I solicit a United States patent.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, § 1.56(a). (Reprinted on back side).

I hereby claim foreign priority benefits under Title 35, United States Code, § 119/365 of any foreign application(s) for patent of inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on the basis of which priority is claimed:

Prior applications  
Check a or b

a. ☐ no such applications have been filed.

b. ☒ such applications have been filed as follows:

FOREIGN APPLICATION(S), IF ANY, CLAIMING PRIORITY UNDER 35 USC § 119			
COUNTRY	APPLICATION NUMBER	DATE OF FILING (day, month, year)	DATE OF ISSUE (day, month, year)
Finland	970237	20 Jan., 1997	
ALL FOREIGN APPLICATIONS, IF ANY, FILED BEFORE THE PRIORITY APPLICATION(S)			
COUNTRY	APPLICATION NUMBER	DATE OF FILING (day, month, year)	DATE OF ISSUE (day, month, year)

If "b" checked, complete

I hereby claim the benefit under Title 35, United States Code, § 120/365 of any United States and PCT international application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, § 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application.

Per Continuation-in-Part  
(CIP) Applications,  
complete

U.S. APPLICATION NUMBER	DATE OF FILING (day, month, year)	STATUS(patented, pending, abandoned)

I hereby appoint the following attorney(s) and/or patent agent(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected herewith:

Bartingale, Kari H.	Reg. No. 35,183	Hassing, Thomas A.	Reg. No. 36,159	Schumann, Michael D.	Reg. No. 30,422
Bastli, Brian H.	Reg. No. 32,560	Hillson, Randall A.	Reg. No. 31,838	Schwappach, Karl G.	Reg. No. 35,786
Beard, John L.	Reg. No. 27,612	Kluth, Daniel J.	Reg. No. 32,166	Schwagman, Michael L.	Reg. No. 25,816
Beck, Robert C.	Reg. No. 28,184	Kowalechuk, Alan W.	Reg. No. 31,535	Sebold, Gregory A.	Reg. No. 33,280
Bogucki, Raymond A.	Reg. No. 17,426	Kowalechuk, Katherine M.	Reg. No. 36,848	Smith, Phillip H.	Reg. No. 20,476
Brennan, Thomas F.	Reg. No. 35,075	Lesky, Michael B.	Reg. No. 29,555	Sorenson, Andrew D.	Reg. No. 33,606
Brussa, Steven C.	Reg. No. 34,130	Lundberg, Steven W.	Reg. No. 30,568	Stawbridge, Douglas A.	Reg. No. 28,378
Bryne, Linda M.	Reg. No. 32,404	Lynch, David W.	Reg. No. 36,304	Strothoff, Kristine M.	Reg. No. 34,259
Carlson, Alan G.	Reg. No. 25,959	Mau, Michael L.	Reg. No. 30,087	Sumner, John P.	Reg. No. 39,114
Casper, Philip P.	Reg. No. 33,297	McDonald, Daniel W.	Reg. No. 32,044	Sumners, John S.	Reg. No. 24,216
Clifford, John A.	Reg. No. 30,247	McDonald, Wendy M.	Reg. No. 32,437	Tellekson, David K.	Reg. No. 32,314
Conrad, Timothy R.	Reg. No. 30,164	Michel, Michelle M.	Reg. No. 33,968	Underhill, Albert L.	Reg. No. 27,403
DiPietro, Mark J.	Reg. No. 28,302	Moy, R. Carl	Reg. No. 30,723	Vandenburgh, J. Derek	Reg. No. 32,179
Edell, Robert T.	Reg. No. 20,182	Mueiting, Ann M.	Reg. No. 33,977	Vietzke, Lance L.	Reg. No. 36,708
Fried, Robert C.	Reg. No. 32,562	Nelson, Albin J.	Reg. No. 28,630	Walter, Paul A.	Reg. No. 30,830
Gafer, Peter J.	Reg. No. 36,517	Rasch, Kevin W.	Reg. No. 35,651	Williams, Douglas J.	Reg. No. 27,054
Gates, George H.	Reg. No. 33,500	Railand, Earl D.	Reg. No. 25,767	Woessner, Warren D.	Reg. No. 30,440
Golla, Charles E.	Reg. No. 26,896	Raggon, Jesse D.	Reg. No. 24,812	Wood, Gregory B.	Reg. No. 28,133
Gould, John D.	Reg. No. 18,251	Rothfus, Joel A.	Reg. No. 22,577		
Greenus, John J.	Reg. No. 33,112	Schmidt, Cecil C.	Reg. No. 20,566		
Hannu, Curtis B.	Reg. No. 29,165	Schuman, Mark D.	Reg. No. 31,197		

I hereby authorize them to act and rely on instructions from and communicate directly with the person/assignee/attorney/firm/organization/who/which first sends/sent this case to them and by whom/which I hereby declare that I have consented after full disclosure to be represented unless/until I instruct Merchant, Gould to the contrary.

Please direct all correspondence in this case to Merchant, Gould, Smith, Edell, Welter & Schmidt at the address indicated below (or if no address is specified, the first address):

- ☐ 3100 Northwest Center, Minneapolis, MN 55402-4131 Telephone No. (612) 332-5300
- ☐ 1000 Northwest Center, St. Paul, MN 55101-2701 Telephone No. (612) 298-1055
- ☐ Suite 1700, 11100 Santa Monica Boulevard, Los Angeles, CA 90025-3302 Telephone No. (310) 445-1140

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Insert FULL name(s)  
AND address(es) of  
actual inventor(s)

201	FULL NAME OF INVENTOR	FAMILY NAME	FIRST GIVEN NAME	SECOND GIVEN NAME
	RESIDENCE & CITIZENSHIP	CITY	STATE OR FOREIGN COUNTRY	COUNTRY OF CITIZENSHIP
	POST OFFICE ADDRESS	POST OFFICE ADDRESS	CITY	STATE & ZIP CODE/COUNTRY
202	FULL NAME OF INVENTOR	FAMILY NAME	FIRST GIVEN NAME	SECOND GIVEN NAME
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	POST OFFICE ADDRESS	POST OFFICE ADDRESS	CITY	STATE & ZIP CODE/COUNTRY
SIGNATURE OF INVENTOR 201		SIGNATURE OF INVENTOR 202		SIGNATURE OF INVENTOR 203
DATE		DATE		DATE

Each inventor must  
sign & date

Note: No legalization or  
other witness required

For Additional Inventors:

Revised 11/1/92

☐ Check box and attach sheet with same information, including date and signature.

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Insert FULL name(s)  
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SIGNATURE OF INVENTOR 201		SIGNATURE OF INVENTOR 202		SIGNATURE OF INVENTOR 203
DATE		DATE		DATE

Each inventor must  
sign & date

Note: No legalization or  
other witness required

For Additional Inventors:

☐ Check box and attach sheet with same information, including date and signature.